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ON

THE PROGRESS OF RECENT SCIENCE;

A LECTURE,

INTRODUCTORY TO THE COURSE

OF

PRACTICE OF MEDICINE,

BY

J. K. MITCHELL, M.D.,

PROFESSOR IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA.

Delivered ~~November~~ October 13, 1851.

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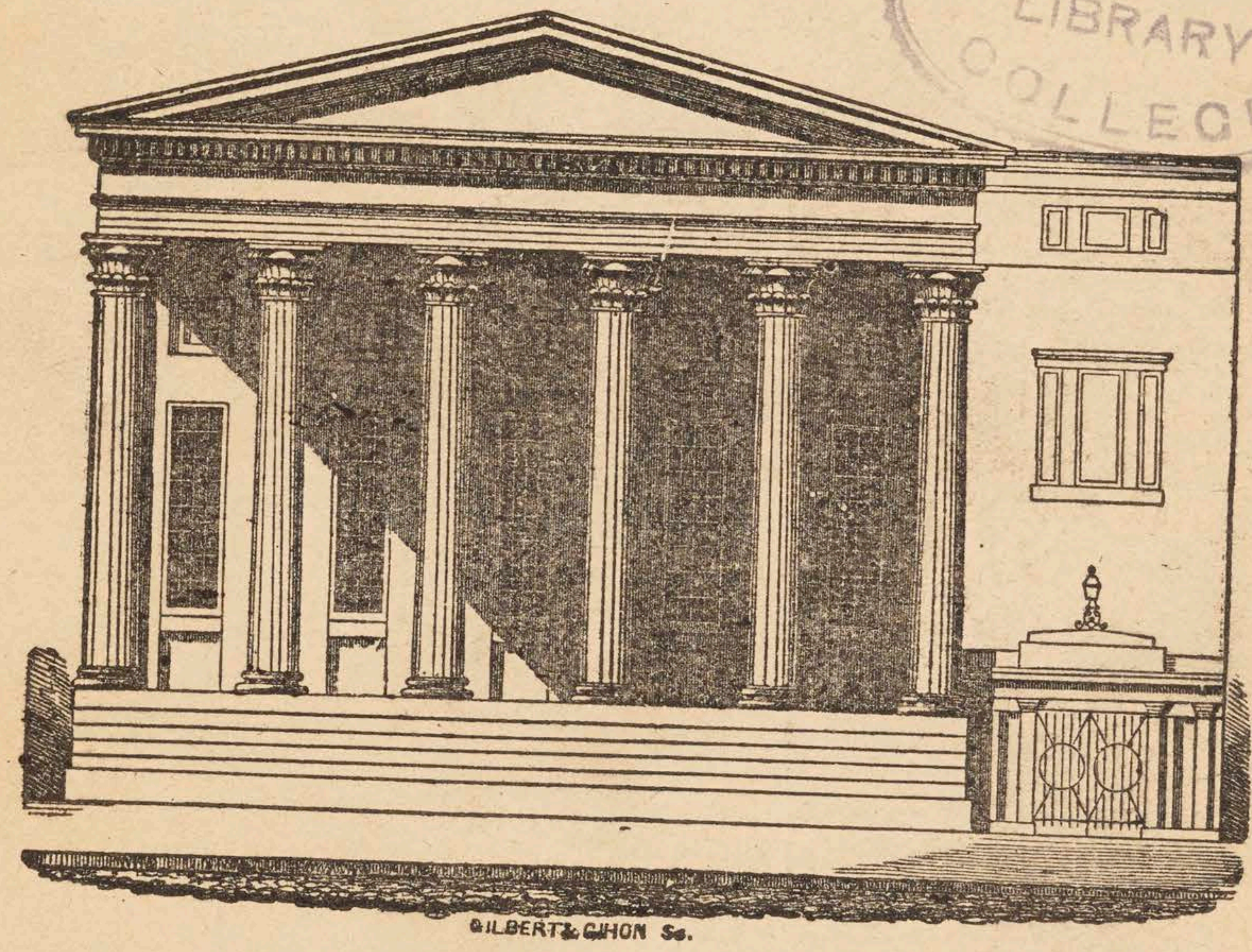

GILBERT & GIHON Sc.

PUBLISHED BY THE CLASS.

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CORRESPONDENCE.

Jefferson Medical College,
Philadelphia, *October* 1851.

To Professor J. K. Mitchell:—

Sir—The Class, desirous of publishing your eloquent and learned Introductory of the 13th inst., have appointed the undersigned a committee to wait on you to obtain a copy for that purpose. Permit us, therefore, to hope that you will, at your earliest convenience, furnish us with a copy for publication.

Respectfully,

James F. Foulkes, N. C., President.
James F. Mabry, S. C., Secretary.
Charles Neff, Pa., Treasurer.
S. Dexter Grant, Maine.
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Thomas H. Burnell, Eng.
E. Czapkay, Hungary.
George S. Walker, California.
J. Da Costa, W. I.

Gentlemen—The Introductory requested by you on behalf of the class, is, with much pleasure, placed in your hands for publication.

Please to present to your constituents my thanks for the compliment implied in the application, and accept for yourselves the kind regard of

Your preceptor and friend,
J. K. MITCHELL.

To Messrs. James F. Foulkes, N. C., President,
Charles Neff, Pa., Treasurer,
James F. Mabry, S. C., Secretary, &c.
Committee, &c.

INTRODUCTORY LECTURE.

Gentlemen:

How shall I find language to properly express the welcome, which, in the name of my colleagues, I now give to you. You come hither from almost every part of the world, to flatter our self-love by your preference, to promote our honorable interests by your liberality, and above all, to exalt us by the vast opportunity which so great a class offers, to extend the peculiar learning of the individual, to hundreds of minds, and thus distribute, by indefinite multiplication, the hard-earned knowledge of a lifetime of labor. For reasons, therefore, honorable alike to you and to us, you are most welcome.

But a short period will elapse, ere most of you will be well prepared to commence the active life of the physician. Perhaps you now look only to receiving the ideas of others; but I hope that many of you, even now, indulge the hope of adding hereafter, to the stock of human knowledge, of improving the profession, as well as of ministering to those who are not of our order.

To incite you thus to hope and act, I shall to-night occupy your time in a rapid survey of the most remarkable discoveries which have been made since I sat as a listener to the professors of other days. In so doing, I shall be necessarily trite and discursive, sometimes perhaps tedious, but if I can make of old facts an useful application, you who come hither earnestly to learn, will excuse even the tediousness which teaches.

In my college-days, one of the professors, whose blood had been chilled by age, and whose hopefulness had been abated by sickness, lamented that he and his class had not been born at an earlier period of the world's progress. "The discoveries," said he, "so illustrative of the men of an earlier age, have been already made, and we can no longer pick up, as they did, the magnificent gems of the sciences, as they open their rich and novel stores to the student of nature. Any one," he observed, "might then have made an imperishable name, for novelties started into sight almost at every step, and the inquirer after truth was overwhelmed with great things, and mighty thoughts. We," said he, "live in a period too late for grand discoveries, and must be content to glean, where they reaped, to gather, Lazarus-like, the crumbs from the rich table of philosophy; to set in order the splendid furniture, not to add to its quantity or its beauty."

A thoughtful student immediately remarked to his companions, that "knowledge could have no limit, because the great architect of the universe was himself illimitable, and his works could not be measured in their grand totality by any being less than himself—discoveries already made, could not even *lessen* the domain of the unknown, which is infinite. Hence the progress of knowledge could not have an end until 'Time itself should be no longer.'" Nay, gentlemen, it is in the very nature of discovery that new knowledge should be itself the productive parent of still newer acquisitions, and that the very brilliancy of one era of science, must be but the precursor of another yet more beautiful, as, in the ascent of a highly diversified and mountainous region, the peak gained to-day, but shows the peaks to be reached to-morrow, and to-morrow, and to-morrow.

Since the period of the Professor's deploring lecture, many a grand discovery has enriched the age, and a new scientific era opens out to our view, giving almost superhuman power to man. Franklin brought the lightning from heaven, and imprisoned it in a Leyden jar, but we have taken it from out its prison-house, and harnessed it to our cars. Now, messages of affection or interest, are sent, with a speed 960,000 times as great as that of the fleetest racer, or the swiftest locomotive. Scarcely has the thought been committed to the electric telegraph, for its journey of a thousand miles, ere the answer is returned. More rapid far, than the revolving surface of the earth, the flying intelligence, as it hastens westward, anticipates hitherto unconquered time himself, and is recorded there, even before the hour of its announcement here. *Time, therefore, is beaten by science.*

This mighty American discovery is opening to us a more exact method of ascertaining the true position of important points upon the earth's surface, thus defining for the high practical uses of the geographer, the surveyor, and the navigator, the true relations of space. It enables also the astronomers, in distant places, to call, as it were, to each other, and announce the very instant of a transit, an eclipse, or an occultation. This great voice of nature travels a thousand miles in the sixteenth part of a second, and may be heard, if desired, in a thousand places in the same moment. *If Time, then, has been beaten, has not space been annihilated?*

This discovery, of the very present time, is to you, gentlemen, of affecting interest. Few of you have failed to leave, in the sweet homes to which your thoughts are constantly turning, some tender parent, some kind friend, or even some one of a still dearer tie. Is it not to them and to you, of priceless importance to know, that your weal or your woe, your sickness or your health, may be made known to them, as readily as if you had remained in their immediate vicinity. You yourselves repose in the agreeable thought that any change at a home, however remote, will be made known to you. Can we measure the value of such a discovery, which serves many an interest, illuminates many a science, and ministers to many a sentiment?

And are all its uses yet known? Why! it is but an infant yet! It is but a few years old, and it is only one of the many children of Electro-Magnetism, a science of the times in which we live, which had not taken its first useful step when the worthy Professor thought that we had been born too late for discoveries.

Another of the so-called imponderables, has, in our own times, been put to entirely new uses. As electricity carries our messages, light is compelled to make our pictures. The airy films that float from the surfaces of things, as they reflect and decompose the sun-light, did for many an age lose themselves in useless space, making sometimes on the eye a momentary impression, but leaving no enduring record of their beautiful existence, save in the memory of the man of taste and feeling. Some gifted sons of art, by much time and labor, preserved upon canvas, or impressed by the graver, images of grand or gentle scenery, or resemblances of men. It was reserved for the genius of the great Frenchman, Daguerre, to compel the fleeting images of things to leave behind them upon his prepared plates, impressions, to which could be given a kind of perpetuity. To effect the most inimitable details, requires now but a few moments of time, and costs but a mere trifle in money. The traveller can now bring home wonderfully exact copies of the wild nature found in remote wildernesses, the *façades* of perfect temples, or melancholy ruins, made without toil, and impressed without loss of time. The son can, almost in any place, procure a likeness of himself, to console his mother during his long absence from home. The lover (students should not be lovers) may compress his handsome features into a ring, a locket, or a seal, and thus give to the object of his adoration many a stolen glance of happiness. But in the arts, who shall announce the present, or foretell the future importance of this amazing discovery, which is also but in its infancy, creeping now, but promising to walk, to run, to fly. Is it unreasonable to expect that colors will be fastened, as form now is, upon solid surfaces, and that perfect images of the scenes and the souls we love, may grace our walls and enliven our homes.

About a year after the delivery of the lecture to which I have referred, came the famous convocation of locomotives, upon the Liverpool and Manchester railway. Sorry machines had slowly conveyed coals to market, but the means of giving great velocity to wheel-carriages by steam was yet to be tried. The result was marvellous. Mr. Stevenson, an English mechanician of singular talent, produced a locomotive, which he happily named the "Novelty;" and to the surprise of the civilized world, made it move with a velocity superior to that of the fleetest race-horse. Eclipse was then eclipsed, steam became the fleetest carrier of the world, and men now travel on many a railway at the rate of thirty, forty, fifty, or even sixty miles an hour with the greatest ease and safety. How much greater speed may yet be made safe and convenient, remains to be seen; but we know, that on this subject, the resources of art and genius are far from being exhausted; and we may reasonably hope to breakfast in Philadelphia, dine in Pittsburgh, and drink tea in Cincinnati on the same day, before the youngest of you, gentlemen, has had the honor of burying his first patient.

My desponding friend thought, no doubt, that when Herschel discovered the place and orbit of Uranus, that the subsidiary bodies of our solar system had been summed up. No astronomer was to achieve a new triumph. Uranus had been seen by many observers, antecedent to the announcement of his *ephemeris* by the great Greenwich astronomer, so that Herschel's discovery was the result rather of patient and enlightened observation than of genius or talent. But since that time, astronomy has achieved the deepest, the highest, the most glorious of triumphs—almost equal in dignity and grandeur to the "system" of Copernicus, and the "laws" of Kepler.

In his solitary study, sat a young man, pale and thoughtful. His eyes were fixed upon myriads of numerals, through whose complexity, his far-reaching mind saw into the untold mysteries of the solar universe. His glass was not pointed to the heavens, his eyes looked not out upon the stars, but his soul, in deep abstraction, pondered over the perturbations of Uranus, as noted for many a year before, by many a casual observer. He measured the intensity and the direction of the disturbing forces, questioned the planet which was seen and known, concerning the unknown cause of its irregularities, and compelled a star, itself beyond the reach of the common eye, at the amazing distance of one thousand eight hundred millions of miles, to tell of the whereabout, the volume, the orbit of its fellow, which no eye, even through an optic glass, had ever yet seen, and whose very existence then came for the first time, upon the mental vision of the youthful sage, through the power of numerical calculation. His was a faith. It was the evidence of things not seen. But it was like that higher and better faith, of which spake the great Apostle of the Gentiles—fast and sure. Full of his discovery, Le Verrier offered his conclusions to the Academy; but learned men, when assembled in bodies, give to enthusiasts but a cold reception. Le Verrier, sure of his position, then wrote to the Astronomer-Royal in Berlin, asked him to point his powerful glass to a certain quarter of the heavens, where must be found at that time, the last of the planets. And there it was; and thence it was traced upon its mighty way, bending, like its fellows, to the distant influence of the great centre, the sun. There is something almost affecting in the thought that Le Verrier should have been denied the first direct sight of the sublime star, towards which his soul had so long been leaning, and which had so long been within his mental vision. It was, however, a fortunate loss, since his adversaries would have charged him with having found by chance, what he detected by reason, and thus have placed in a common category, one of the most magnificent discoveries of modern times, a beautiful illustration of the gigantic power of calculation.

Other brilliant discoveries in astronomy have made our age illustrious in the book of the stars. Many small planets have been seen between Mars and Jupiter, and we have good reason to believe that the sun of our earth illumines yet many an undetected world.

The greatest astronomical novelty, the most curious meteorological anomaly, owes its explanation to the American astronomer, Olmstead. He has shown that in vast rings, countless bodies, of comparatively small dimensions, cluster together, and revolve, as do the planets, around the sun; that these bodies become visible when the orbit of the earth approaches their orbit; that sometimes they are entangled in our atmosphere, catch fire from their enormous velocity, and fall to the earth as meteoric stones. In this way the shooting stars and meteors are shown to be but very little planets, which, in composition and orbitar motion, resemble our own earth, and almost fill the planetary space with their countless squadrons.

But the most unlooked-for astronomical discovery, the parallax of the fixed stars, was made by Bessell in these unproductive days. By the highest mental effort, aided by profound knowledge, he succeeded in measuring the hitherto illimitable space between the earth and the fixed stars, and showed to men what had baffled Kepler and puzzled Newton. These stars, that twinkle in the firmament, are now known to be, the nearest of them, at about six hundred thousand times the distance of the sun from the earth. Supposing that one could take one step to the moon, it would require four hundred such steps to reach the sun, and two hundred and forty millions of such steps, to arrive at the nearest fixed star. Yet, by a correct process, acknowledged as such by other astronomers, the great Russian philosopher has measured a space, the bare mention of which is startling.

Did the occasion permit, I might profitably and agreeably occupy the time even of students of medicine, with the wonders of the double and triple suns, which stud the universe with strange anomalies, and now fill the astronomical world with curious discoveries; but I must begin to tread upon the earth, and bring you nearer to your profession. Yet I shall make no apology for carrying you out upon an excursion into these new fields of knowledge, since a liberal physician, as his very name implies, should not be entirely ignorant of any science. Everything in the visible universe influences, more or less, the soul and the body, both of which come at times within the province of the doctor.

It was in 1816, that I was told that I had been born too late for discovery. At that very time, a French physician had just rolled up a quire of paper, with which, for the first time, he listened to the beating of the heart, and the breathings of the bronchi of a female patient. One may easily imagine the surprise of the patient, on beholding a man of science applying to her chest one end of a roll of paper, and resting his ear upon the other. Still greater, no doubt, was the surprise of the doctor, who thus heard, clearly and strongly, the internal actions of the chest. That suddenly conceived act, was the birth of a new science. Thoracic acoustics, the discovery of the immortal Laënnec, came then into being. Its importance can only be properly appreciated by one who has lived long enough to remember the sad uncertainty, the dark doubts, the bewildering phenomena of the olden times, whenever an obscure disease of the chest became the subject of scrutiny. No man could tell the difference between acute phthisis, pneumonia, or pleurisy, with any certainty. Previously, what teacher spoke of mucous rhoncus, of sibillant and sonorous bronchial sounds, of vesicular murmurs, of crepitant and sub-crepitant rhonchi, of cavernous respiration, of pectoriloquy, of amphoric sounds, of valvular murmurs, of *bruit de soufflet?* The great explorer of the chest not only defined known diseases, but discovered and described many thitherto unknown, and dying, left behind him a legacy to the human race, scarcely less valuable than that of the immortal Jenner. In the short period of his active life, he built up a new sub-system of medicine, brought within the domain of science extensive tracts, nay more, fenced in and cultivated them to a degree which beautifully exemplifies the prodigious power of industry.

Whilst Laënnec was patiently and laboriously evolving, one by one, the grand truths which lay for centuries hidden in the breast of man, another inquirer after truth was immuring himself in the impure wards and sickening dissecting rooms of the Parisian hospitals, collecting, painfully and slowly, the facts which were to make him the founder of a new system of investigation, and the creator of conclusions at once novel and astonishing. At our time of day, much of the knowledge which the talent and industry of Louis have given to the world, and made its unquestioned property, is so trite, so commonplace, that we almost forget the mighty obligation under which we lie to the unpretending author of the works on phthisis and typhoid fever; works full of the richest novelties and most original observations; works which for industry, method, analysis and judgment, present an example, in the history of our profession, the most remarkable and most useful. I hardly know how to find language strong enough to commemorate fittingly, the painful, prolonged and hazardous interrogation of nature, to which we owe much of the certainty and the power of modern medicine, which is exceeded, in the brilliancy of the example, only by the mightiness of the results.

So long ago as 1764, Cotugno, an Italian physician, a good observer and ingenious thinker, discovered that many dropsical patients had a coagulable urine, dependent for its coagulability upon the presence of albumen, an observation confirmed by Mr. Cruikshank, in 1797. Dr. Wells and Dr. Blackall, about the years 1812 and 1813, published observations upon the coagulable property of the urine of many dropsical patients; but it was reserved for an eminent English physician, Doctor Bright, to trace the connection between the continued coagulability of the urine and a granular degeneration of the kidneys. This very valuable discovery was given to the world by its modest, yet distinguished author, in 1827. Medical writers have bestowed upon the discoverer the very peculiar honor of attaching his name to the malady; and, who is now so ignorant as not to know what is meant by "Bright's Disease?" This discovery was a kind of revolution, redirecting the minds of men upon an obscure and perplexing subject. It at once explained the cause and the peculiarity of the phenomena of many hydropsies, and illuminated philosophically, the observations of Cotugno, Wells, and Blackall. Through it, we perceive a newly detected cause of dropsies, and are enabled to distinguish the anasarca which is dependent upon the state of the kidneys, from that which arises from general causes, or is produced by maladies of the heart or the liver.

In the first volume of the *Philadelphia Journal of the Medical and Physical Sciences*, originated and then edited by my good and great preceptor, Dr. Chapman, I find the following notice: "*Remedy for Bronchocele.*—Dr. Coindet, (of Geneva), has announced through the medium of the *Bibliotheque Universelle*, for July, 1820, some experiments with iodine in bronchocele. He has exhibited it in the form of a tincture composed of forty-eight grains of iodine and one ounce of alcohol, and in the form of a salt, forty eight grains of hydriodate of potash, dissolved in an ounce of water. The dose of either of these preparations is *ten drops*, three times *per diem*, gradually increased to twenty." This cautious dose of about one grain a day of iodine or iodide of potassium, so modestly put forth by its originator, was the first step into medical use, of a medicine, of which the present utility can scarcely be limited by any known measure of value. While iodine possesses most of the alterative properties of mercury, and is scarcely less revolutionary in its tendencies, it is tonic, and is corrective of glandular enlargements, and irregular deposits, to a much higher degree; whilst it exerts upon patients much less injurious influences. The diversity of its applicability, the rapidity and power of its action, and the general hurtlessness of its tendencies, make its introduction into the *armamentum medicum*, one of the most important events in the history of medicine. Yet, gentlemen, when I studied medicine, it was an article new to the chemist, and was not described by the pharmacopolist, nor administered by the physician in any case whatever.

Immediately after my graduation, which took place in the spring of 1819, I was compelled, by want of health and means, to accept of the liberal offer of a kind mercantile friend, in whose ship I visited tropical countries. Painfully to this day, do I remember my contests with miasmatic diseases, so prevalent in hot climates. Cinchona was, with arsenic, the then resource of physicians in such cases, and bark was an indigestible, and arsenic an irritating remedy. How I strove by customary contrivances to make one sit lightly on the stomach, and in how many ways did I endeavor to correct the irritancy of the other; but alas, too often in vain! In violent, or obstinate cases, large doses were necessary, and large doses were often immediately rejected. Then I used bark-injections, bark-jackets, bark-inunction, and sheets dusted with bark, but often fruitlessly. If I resorted to arsenic as an alternative, I was compelled to wait for the distant influence of small doses, or I produced by larger ones, a *gastro-enteritis,* the very thing which, according to the then dominant theory of Broussais, was itself the essence even of an intermittent. Arsenic too, caused hydropic effusions into the areolar tissue, and sometimes into the great serous cavities, by which events, patients were often alarmed, occasionally inconvenienced, and sometimes injured. Driven from this resource, I conned over the vast catalogue of mineral, vegetable, and animal substances, supposed to exert some curative influence. I need not now recal their names from the dust and oblivion to which, at least as curers of ague, they have been long consigned; but at that time I had a goodly hoard of them, and many a poor sailor shook, day after day, while I was giving sulphur, and carbon, and copper, and iron, and zinc, and enlivening his sufferings by the diversification of blisters to the nucha and the legs. These events took place in the years 1819 and 1820. In 1821, I had the great pleasure of seeing, for the first time, the active principle of cinchona separated from its impurities, and saw, you cannot imagine with what delight, the few grains of this invaluable remedy, representing in power an ounce of bark. No one, who had not contended with tropical intermittents, can possibly feel as I then felt, especially when I saw the verification of the power of the new remedy over the old disease. Since that time, quinia has constantly grown in public favor, has been applied successfully in many new cases, and may be considered as one of the most extensively and indispensably useful discoveries of modern times. This, also, is a triumph of the period at which we live—for, although Andrew Duncan just touched it in 1803, he evidently misunderstood the phenomena presented, and, although it was seen by Gomez, and Runge, and Lambert, its demonstrated existence in the year 1821, made the names of Labellardiere, and Pelletier, and Caventou, illustrious among men forever.

There was yet another triumph of our too-late times. As I have already said, it was in 1816 that we had lived too late; but it was in 1817 that a druggist of Eimbeck, in Hanover, presented to the profession the first well-made specimen of morphia. The poisonous narcotine, and the other embarrassing associates of the composing drug, having, by the art of Sertuerner, been entirely removed, the "sweet oblivious antidote" of pain and sleeplessness, and nervous irritation, and muscular tumult, blessed the world with its benign presence.

The detection of morphia and quinia, led to the discovery of many of the medical alkaloids, some of which have also greatly enlarged the potency of the medical art. Among these, not the least important is strychnia, which is almost the only remedy for some of the most intractable of our disorders. It was given to us by Pelletier and Caventou, in 1818. The alkaloids, therefore, in all their rich variety, and priceless utility, belong to our era alone. Not one of them was known to me when a student. They arm you, gentlemen, with a power over disease and pain almost divine, and give you a mastery over human ills, such as even the dreamer of my time did not anticipate. Have you lived too late?

Among the most interesting discoveries of our own times, is that of the association with many of our diseases, of minute microscopic vegetations. So late as 1839, Schœnlein took the first step in this new department of medical science, by showing the vegetable nature of *favus* (porrigo lupinosa of Willan), and describing its spores and filaments. In 1840, Remak published observations made in 1837, on the fungous character of the vegetations of favus. In rapid succession Gruby, Fuchs, Langenback, Hannover, Bennett, Müller, Retzius, Lebert, Robin, and a host of others, detected vegetable formations in a great variety of cutaneous disorders, also in diseases of the mucous tissues, and as apparent accidents of phthisis, typhoid fever, dysentery, dyspepsia, and many other maladies. Dr. Leidy, of our own city, has gained an enviable reputation by showing that certain insects have intestinal vegetable parasites (entophytes) habitually peculiar to them, and which, like entozoæ, exist consistently with the health of the insects which contain them; that the genera and species of these entophytes, vary with the genera and species of the insects, no vegetable of the same kind being found in different species of insects. These numerous and progressive discoveries have been made the foundation of a new theory of malaria, which, whatever may be its final reception by the profession, well explains the present difficulties of that most obscure, yet most important subject.

But the crowning medical discovery of the present time, is that which teaches us the extraordinary potency of nitrous oxide, sulphuric ether, and chloroform, in subduing existing pain, or preventing the sufferings of a surgical operation, or of parturition. Anæsthetic inhalations belong to our time and country. Their importance is thus stated by a writer in the *British and Foreign Medical Review*, as far back as 1847: "That a means should be discovered, and discovered in our own day, calculated not merely to furnish positive relief in many of these terrible inflictions, but almost to exceed in its practical working, the wildest dreams of the philanthropic enthusiast, is a matter so much within the domain of the marvellous, almost of the supernatural, that it is no wonder we should not be yet prepared to consider it in all its bearings with the cool blood of philosophy. Even in this era of steam and electricity, of macroscopes and microscopes, the discovery is one that arrests more universal attention, and excites a deeper interest, *than any mere physical fact whatever;* not even excepting the magnificent achievement of Leverrier, which 'yields the lyre of Heaven another string.'"

Although inhalations of nitrous oxide and ether had been frequently resorted to for medical purposes and for amusement, and although the insensibility to causes of pain had been observed in those who were thus placed under their influence, yet, until Sir Humphrey Davy published his first work, his "Researches," no one appears to have entertained the idea of thus removing or preventing pain. Davy observed that, in two instances, headache was removed by the inhalation of nitrous oxide, and he even used it to relieve the "intense physical pain" caused by a protruding wisdom-tooth. He finally suggested its surgical use, in the following remarkable words:—

"As nitrous oxide in its extensive operation, appears capable of destroying physical pain, it may probably be used with advantage in surgical operations."—(*On Nit. Ox.* p. 556.) In the "*Dictionnaire des Sciences Medicales*," published in 1815, Nysten speaks of the familiar use of ethereal inhalations, and recommends them to allay pulmonary irritation and to abate the pain of colic and other diseases. Notwithstanding these pregnant hints, physicians continued to neglect the potent agents thus placed within their reach, until within the last ten years, when a dentist of Hartford in Connecticut, of the name of Wells, resorted, in the prosecution of his business, to the inhalation of nitrous oxide for the prevention of the pain of his dental operations. According to the unexceptionable testimony of judges, lawyers, divines, and physicians of Hartford, he not only used nitrous oxide often, but ether in two or three cases. Full of the value of his discovery, Wells proceeded to Boston, and asked permission of Dr. J. C. Warren to operate upon a person under the influence of nitrous oxide, before the doctor's class of medical students. With characteristic liberality, Dr. Warren gave him the desired opportunity, but as the experiment, from some untold cause, failed, Dr. Warren was unconvinced, and soon forgot the exhibition and its obscure agent.

About two years afterwards, Dr. Morton, a dentist of Boston, who is alleged to have been a student of Wells, relates that he applied to Dr. Charles T. Jackson to make for him nitrous oxide for dental operations, and Dr. Jackson suggested the greater convenience of sulphuric ether, often substituted for the other. Accordingly, these gentlemen fabricated an ether mixed with some narcotic, called it Letheon, and administered it to patients by inhalation. Probably this anæsthetic would again have disappeared from use, had not Dr. Warren, the eminent surgeon and man of science, to whom I have already alluded, given it the benefit of a trial, and afterwards the sanction of his high authority. With a courage which deserves all commendation, and a magnanimity which is above all praise, Dr. Warren persevered in experiments upon this discovery *of others*, and by his operations and his writings, gave to volatile anæsthetics a permanent place in the history of medicine. The medical faculty of Boston, almost to a man, immediately adopted the anæsthetic practice, and concurrently with Dr. Warren, gave to it many new directions, until at last all the most painful human disorders felt its meliorating power. The prophecies of Beddoes, and the aspirations of Davy met a happy fulfilment in this distant land of ours. As the practice of variolous inoculation, forbidden by the parliament of Paris, and disused in England, because it had slain the son of a duke, was arrested in its downward career and sustained by the physicians of Charleston, who sent it back with unquestionable evidence of its utility, to bless again the Fatherlands; so this mere dream of the Old World acquired with us a local habitation, and gained a name now echoed from shore to shore around the whole earth. The truth thus practically illustrated, can never again be lost among men, for anæsthetics must remain forever the speediest and most potent means of assuaging pain or preventing the sufferings of surgical and obstetrical patients.

Next to Dr. Warren and the Boston faculty, I think you will admit, that we owe the largest debt of gratitude to Dr. Simpson of Edinburgh, for the extent and variety of his experiments, the able support of his pen, and most of all, for the addition of chloroform to the list of anæsthetic agents; for, although Guthrie of Sackett's Harbor, first made and described chloroform, Dr. Simpson seems to have discovered and applied its most wonderful power of sedation.

Here then is another and an American discovery, at least in the practical sense of the word, which stands out in high relief among modern contributions to science, and is, next to vaccination, the most important event of the age. Yet this, too, has been given to us since my good old friend told us that we had been born too late for discoveries.

If I might intrude for a few moments upon the ample domain, so beautifully cultivated by my eminent friend, your Professor of Institutes, Dr. Dunglison, I might show you that, since the period to which I refer, physiology has been almost recreated, and pathology been born again. The new subsciences which have started into being under the wing of physiology, have changed not only the ideas, but the language of men, and rendered the books of the years just past, obsolete, and nearly useless. Cell-life, with its cytoblasts and cytoblastema, looms up largely upon the astonished eye. Endosmose and exosmose of liquids, and the penetrancy of gases through living membranes, belong, as discoveries, to this branch, and to our times. Wonderful novelties in fact and principle, have been produced by the labors of Sir Charles Bell and of Marshall Hall; and the functions and powers of the nervous system are indebted chiefly to these great men for their present illustration.

I might, in the department of your learned and skilful teacher of chemistry, show that the immediate successors of Priestley, Scheele, and Lavoisier, have acquired imperishable honors by the numerous discoveries of Gay-Lussac, Berzelius, and Davy, that even their successors the men of our own belated age, are to fill to fulness the mighty trump of fame. Hare and Liebig and Faraday, are too near the eye of the world to be seen as yet in their just proportions; but as the sun of science, which culminates over our times, descends to the west, he will cast their shadows, broader and longer, over the earth, which they have lived but to adorn and ennoble.

Time warns me of too great a trespass upon your patience, else might I show you, the mighty achievements in the practice and principles of surgery, which belong to our era, and the vast additions to materia medica, made in our own days, but happily you will have them from the able teachers of these branches of medicine, in a better way, and upon a more convenient occasion.

Therefore, let me cease to call over the great catalogue of Time's present triumphs, which, even in a hasty survey, have been shown to be prodigious in value, and almost infinite in number.

You are no doubt convinced that the age which is passing has not fallen behind the age that has passed, either in talent or opportunity; but you may, at first view of the grand assemblage of recent discoveries, fall into the error of the desponding Lecturer, to whom I have so often referred, and think that there is little left for you to do, save to pick up the dust from the sweepings of philosophy. A moment of reflection, however, will convince you that a pause in the career of discovery can arise, not from any poverty in the domain of the unknown, but from the indolence, the ignorance, or the apathy of men. The field of nature is illimitable, and the objects of interest which stud its surface, and repose in its depths, are, in every part, the work of God, and therefore worthy of deep study and ceaseless labor.

We are too apt to think that discoveries require a special genius, and a rare combination of talents. Yet if we examine the private history of even the greatest scientific achievements, we shall learn that attention and industry contributed more than genius or peculiar talent to the advancement of science. As *Action!* ACTION! ACTION! is the essence of oratory, *Work!* WORK! WORK! is the soul of discovery.

That no man is a hero to his *valet de chambre*, is a trite remark, but one from which we may extract a valuable lesson. The nearer we approach to great men, the less do they commonly seem to be. The more we see of them, the more do they descend to the level of common humanity. In conversation they are seldom remarkable for either thought or expression, and not unfrequently a successful interrogator of nature, asks commonplace questions and gives commonplace answers. In fine, when men are brought into immediate and extemporaneous assemblies, the differences by which they are separated by fame and achievement, seem to dwindle into insignificance. They can show then only their talents, and these differ generally but little from those of others; but they cannot then show the indomitable will, the prolonged search, the untiring patience, the hope deferred, which maketh not them sick, but rather invigorates resolve, and strengthens persistency. The brilliancy of an era in science will more depend upon the habits and spirit of the age, than upon its peculiar men, or its eccentric minds. The first germ of, at least, physical truth is commonly an accident. The inattentive man may overlook it, the careless man undervalue it, or the indolent man neglect it, and it may thus be lost for a time to the world. But nature knocks frequently at the door of observation, and attracts at last the attention of some one whose curiosity prompts him to investigate experimentally, and whose good sense teaches him that nothing new in nature can be valueless.

A favorite exemplification of this truth, is displayed in the history of the discovery of the safety-lamp of the miners. A mixture of oxygen and hydrogen is explosive. *Many* chemists knew also, that, at the orifice of a long narrow pipe, such a mixture could be safely ignited; but only one person thought the fact worthy of being worked at. In what could the fact consist? Was it the mere length of the pipe? That was shortened until it became but a small hole in the side of the reservoir! Was it the rapidity of the moving mixture of gases? The motion was made as slow as possible! Still the gases did not explode, when fired at the small orifice. By enlarging the aperture, an explosion showed that there was, for safety, a limit in its size. By the alteration of the shape of the orifice, form was found to be of no consequence to the experiment. An addition to the number of orifices did not increase the danger of explosion, and a plate, full of minute holes, exempted the operator equally well from danger. A lighted taper placed within a metallic box so perforated, could be plunged into an explosive mixture of gases with impunity. When substances were tried which were not as good conductors of heat as the metals, the results were less successful, and thus, step by step, the mere industry of the experimenter, led him to the sure conclusion that the whole effect was due to the cooling influence of the sides of the metallic orifices. Here was a great deal of labor and very little thought, save such as any ordinary person, with aroused curiosity, could have given to the subject. Nor did it require much mental effort to discover that the taper which burned quietly in a perforated box, amidst an explosive mixture, would burn as well in the combustible atmosphere of a coal-mine. But that made it a safety lamp. That lamp is among the most brilliant and beneficent discoveries of Davy, made by steps, no one of which was remarkably difficult to even an ordinary mind, yet the grand result startled and delighted the world. Could the spirit of the grand Englishman now look down upon this assemblage, and listen to my discourse, would he think me unjust to his memory, or unkind to his fame? Oh no! Truth never offended him; and should he not rather approve of the praise given to the industry which was due only to himself, than to the talent which he derived from nature!

Shall you and I, gentlemen, gather a~~n~~ useful lesson from these things, and learn to observe carefully and follow industriously whatever of novelty is offered to us on the path of life. Much is lost by the hasty assumption of the insignificance, or easy explicability of new phenomena. Nothing in nature really new is insignificant, and nothing that God has made is unworthy of the utmost labor, for its extrication and elucidation.

Even the seeming superiority in the reasoning powers of some men, often depends upon knowledge of a given subject which has been the product of years of labor, AND OF NOTHING ELSE. Nations, like individuals, are more illustrated by labor than genius. The Americans are the most continuous workers in the world, and the progress of the country bears a just proportion to this grand cause of prosperity. Distance, and the habit of looking elsewhere for news, have concealed us, as it were, from the observation of the rest of the civilized world; but we are to be no longer hidden from men's eyes, and if too little was asked from us before, too much, I fear, will be expected from us now. Be that as it may, let us endeavor to take our share at least, of the work to be done by this generation. You now see how much more you know than did your immediate predecessors; how many new principles illuminate your professional pathway; what a multitude of new remedies cluster to your service. Yet they are but the expressive offspring of attention, laudable curiosity, and liberal industry. Such qualities were the illustrators of Bretonneau, of Laënnec, of Louis, of Bright; and may be the architects of the fame of all who will excel in well-directed labor.

If I can, by the citation of such examples, and the history of such results, persuade even one true son of science among you, to devote himself assiduously to the investigation of the novelties which forever offer themselves to every inquirer after truth, I shall deem myself more than compensated. The effort I am now making, is to call you to that field of glorious enterprise, in which men contend—not for the conquest of empires—not for the "boast of heraldry, or the pomp of power," which, of doubtful utility, soon perish; but for the benefit of all mankind forever.

> "Be then our thrilling war-cry—'For the human race,
> Not for ourselves alone, our friends, our home;
> But for our fellow men, beneath Heaven's wide spread dome.'"

Dec. 17. 1851.